

THE EPIPLEMINAE (LEPIDOPTERA: URANIIDAE) OF THE KUMAON HIMALAYA¹PETER SMETACEK²¹Accepted November 2004²The Retreat, Jones Estate, Bhimtal, Nainital 263 136, Uttaranchal, India.

Email: petersmetacek@rediffmail.com

Fourteen moth species of the subfamily Epipleminae are reported from the Kumaon Himalaya. Of these, nine are new records for the Himalaya west of Nepal. Observations on their ecology are noted. One new species, one new form, four new genera and seven new combinations are proposed.

Key words: Epipleminae, Uraniidae, Lepidoptera, Kumaon, Himalaya

INTRODUCTION

The Epipleminae comprise a group of small moths and are currently placed in Family Uraniidae, although earlier (Hampson 1895, 1896; Barlow 1982; Holloway 1986) they were accorded family rank. The greatest diversity of species is found in hilly parts of the Tropics, while relatively few species are found on the lowlands proper. In the Himalaya, they ascend to at least 2200 m and are generally found in or near forests, rarely on meadows or in degraded areas.

STUDY AREA

The present study was carried out in the outermost range of the Kumaon Himalaya, in the state of Uttaranchal. All except three of the species discussed in this paper were collected or noted in Jones Estate (1500 m), 2 km by road northwest of Bhimtal. Bhimtal lake, in the center of town, lies at 29° 20' 40" N and 79° 36' 16" E in Nainital district.

Two specimens of *Phazaca leucocera* (Hampson) were recorded at Durgapur (1600 m), a suburb of Nainital. A pair of *Dysaethria himalayica* sp. nov. was recorded in Maheshkhan 17 km north of Bhimtal in the Gagar range at 2100 m. The single specimen from Garhwal was taken in a forest near Auli ski resort above Joshimath in Chamoli district at 2100 m.

All these locations except Durgapur are densely forested, with different species of Oak (Fagaceae) as nodal species, *Quercus leucotrichophora* A. Camus in Jones Estate, *Q. leucotrichophora* and *Q. floribunda* Lindley ex A. Camus in Maheshkhan and *Q. floribunda* and *Q. semecarpifolia* Smith in the forest near Auli. In addition, there are stands of *Pinus roxburghii* Sarg., *Cupressus torulosa* D. Don and tropical deciduous species such as *Sapium insigne* Trim., *Bauhinia vareigata* L., *Erythrina suberosa* Roxb., etc. in Jones Estate. Durgapur has a mix of Chir Pine (*Pinus roxburghii*) and miscellaneous deciduous forest, the Oak having been practically eradicated through human agency.

MATERIAL AND METHODS

The present paper is based on specimens recorded by the author. All the specimens examined in this study are from the period after 1990 and are in the author's personal collection at Jones Estate, Bhimtal, Nainital, Uttaranchal.

All the specimens examined, except a pair of *Dysaethria himalayica* and one specimen of *Somwaria restricta* (Hampson) comb. nov. were attracted to artificial light. The main attractants used were mercury vapour lamps of 125 W and 160 W.

The genitalia of the species were not examined. The key diagnostic features for *Dysaethria* Turner and some other genera are to be found in the genitalia (Holloway 1998). However, some external characters are also diagnostic. These, especially the hindwing venation, have enabled me to place species in genera or propose new ones, as discussed in the systematic section.

In the systematic section, the distribution of species has been excerpted from Hampson (1895, 1896) and Holloway (1998). Hampson does not mention forewing length, hence the measurements given are of the specimens examined in this study.

SYSTEMATIC SECTION

Dysaethria reticulata (Moore) comb. nov. (Fig. 1)

1888. *Descr. new Lep. Ins. Colln.* W.S. Atkinson: 259

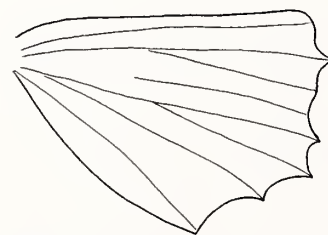


Fig. 1: Hindwing recto venation of *Dysaethria reticulata* (Moore) male

Material Examined: 16 exs., 30.viii.1995 (bred); 7.viii.1997; 15.viii.1997; 16.viii.1997 x 5; 22.viii.1997; 23.viii.1997; 1.ix.1997; 25.v.1998; 15.vi.1998; 21.vi.2000; 28.viii.2000; 14.ix.2004.

Forewing Length: 9-13 mm.

Expanse: 30 mm (Hampson 1895); 20-30 mm (mihi).

Distribution: Sikkim; Khasis (Meghalaya).

Remarks: A new record for Kumaon. It is well established in the Bhimtal valley, where it is perhaps the commonest member of its Subfamily. It was bred on *Jasminum dispersum* Wallich (Smetacek and Smetacek 2000). It is common around the main study site where there are many plants of *J. dispersum*, over five individuals being attracted in the course of an evening during their peak flying times. Since *J. dispersum* occurs as far west as Kashmir, *D. reticulata* probably occurs west of the Bhimtal valley, but it is not certain how much further west. It does seem unlikely that it occurs in Kashmir.

D. reticulata rests with its head and costae of the outstretched forewings nearly touching the substrate, while its wings and body are held at an angle of roughly 45 degrees to the substrate. The tip of the abdomen and tornal parts of the hindwing thus become the highest parts of the moth above the substrate. This position is adopted irrespective of the plane of the substrate or the direction in which the moth is facing. Usually, the moth takes up this position immediately upon settling, especially if it has been disturbed and forced to rise from its previous perch.

Besides the material examined, this species has been noted to be on the wing continuously from late June to late October, with peak flying times at the end of June, the first week of August and the third week of September.

The material examined matches Hampson's (1895) description. In addition, there is a curved antemedial line on the hindwing and some dark submarginal marks on the forewing between the apex and vein Cu1a. The sexes are similar.

Dysaethria himalayica sp. nov. (Fig. 2)

Material Examined: 4 exs.: **Holotype:** 4.vi.1998, female, Maheshkhan 2100 m, Nainital district. **Forewing Length:** 16 mm.

Paratypes: 4.vi.1998, male, Maheshkhan 2100 m, Nainital district; 28.vii.2000, female; 19.xi.2000, female, Jones Estate, Bhimtal. **Forewing Length:** 13-16 mm.

Expanse: 28-34 mm.

Distribution: see under remarks.

Type Locality: Same as Holotype.

Etymology: The specific name refers to the presence of this species in the Himalaya.



Fig. 2: *Dysaethria himalayica* sp. nov.

Diagnosis: Differs from Hampson's (1895) description of *Epiplema moza* Butler in the following points: on the forewing, the three dark submarginal specks below the apex are present, but the lowest speck is expanded into a relatively large lunule; on the hindwing, there is a faintly discernable medial line highly angled at vein M_3 and a dark speck rather than a brown line on the discocellulars; there is a dark, ill-defined submarginal band from vein M_3 to the dorsum. The hindwing has tails at veins M_3 and R_s and is toothed at M_1 .

This appears to be the only species of this genus of those examined that displays sexual dimorphism, albeit very slight, in the ground colour of the wings. The colour of the females is darker than that of the males and consequently the markings are clearer in the female.

Remarks: Hampson (1895) treated this species as *Epiplema moza* Butler. Since *moza* is a Japanese taxon and the allied *Dysaethria suisharyonis* (Strand) (from Taiwan) and *Dysaethria subflavida* (Swinhoe) (from Malaya, Java and Borneo) are not known to extend to the Himalaya, it followed that the Himalayan taxon lacked a name; hence the present name is proposed. Material from other locations, i.e. Himachal Pradesh and Meghalaya, from where "*moza*" has been reported (Hampson 1895) has not been examined, but it is likely that *himalayica* is found in Himachal Pradesh. However, material from the Khasi Hills will need to be compared before *himalayica* can be reported with certainty from there.

It is a rather rare moth in the Bhimtal valley. It appears to be a commoner in forests above 1600 m. I have found them settled on the upper surface of leaves of low growing shrubs during the daytime in damp ravines in Maheshkhan. Only two specimens have been recorded so far from the Bhimtal valley, both of them females. There is no information on how far these moths can travel in the course of dispersing the species. Therefore, it is uncertain whether these females were from a small, established population near the main study site or whether they are from a distant population that reached Jones Estate in the course of dispersing the species. It is noteworthy, though, that males have not been recorded so far in Jones Estate, which suggests that the latter possibility is the likelier.

The species appears to have at least two annual generations. It is likely that it will also be found in September at higher elevation, eg. in Maheshkhan, when other species recorded from above 1600 m such as *Dysaethria multistrigaria* (Moore) comb. nov. are also on the wing. The record from November is unusual since few moths are on the wing at that time. It is possible that the specimen recorded is an unusually late specimen rather than a member of a regular pre-winter brood.

The moth spends the daylight hours resting with the wings outspread and pressed flat against the substrate, with no part of the moth raised above the surface. There is a gap between the fore- and hindwings.

***Dysaethria multistrigaria* (Moore) comb. nov. (Fig. 3)**

1888. *Descr. new Ind. Lep. Ins. Colln. W.S. Atkinson*: 260.

Material Examined: 9 exs.: 10.ix.1995; 28.viii.1997; 24.vi.1999; 7.vii.1999; 7.ix.1999; 19.vi.2000; 18.ix.2000; 20.ix.2000; 26.ix.2003.

Forewing Length: 10-12 mm.

Expanse: 26 mm (Hampson 1895); 22-26 mm (mihi).

Distribution: Shimla (Himachal Pradesh); Sikkim.

Remarks: Not a very common species in the Bhimtal valley. It is, however, a regular visitor to the MV light and appears regularly every year. There are at least two annual broods, one beginning in the second half of June and continuing to July and the second in September. Peak flying time is in the second week of July, when six or more individuals may appear in the course of an evening.

Individuals have also been noted in late July (18.vii.1999) and in August (9.viii.1999). It is not clear whether these were stragglers or members of a small brood. The former possibility seems more likely.

This species rests in a manner very similar to that adopted by *D. reticulata*, which is already described under that species. It differs slightly in that the head and costae of the forewings are held further off the substrate.

The specimens examined match Hampson's (1895) description, but some are smaller than the material examined by Hampson.

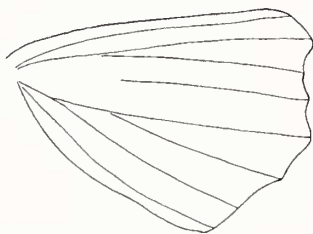


Fig. 3: Hindwing *recto* venation of *Dysaethria multistrigaria* (Moore) male

The record from Shimla indicates that the species will probably also be found at higher elevation, about 2000 m. Its flying time may be more restricted in the higher reaches of its range.

***Dysaethria rhagavata* (Walker) (Fig. 4)**

1861. *Cat. Lep. Het. in Brit. Mus.* 23: 848.

Material Examined: 1 ex.: 7.x.2001 female.

Forewing Length: 13 mm.

Expanse: 28-32 mm (Hampson 1895); 28 mm (mihi).

Distribution: Sikkim, Khasis (Meghalaya), Sri Lanka.



Fig. 4: *Dysaethria rhagavata* (Walker)

Remarks: Only a single specimen has been recorded so far. It might be commoner at lower elevation.

The specimen has been placed under this species tentatively. According to Holloway (1998), *D. rhagavata* is found in Sri Lanka, while a specimen from the N.E. Himalaya (Khasis), in the British Museum (Natural History) in London (? the same on the basis of which Hampson included Khasis in the distribution of *rhagavata*), is probably referable to *D. rhagavolita* Holloway.

The specimen examined in the present study differs from Hampson's (1895) description in lacking the dark triangular mark on the middle of the forewing's outer margin; from his description of typical *rhagavata* it differs on the hindwing in having the post medial line angled at veins M_3 and M_1 and the lunules on the outer margin of the hindwing not extending nearly to the anal angle. In addition, the specimen bears dark blotches on the dorsum of both wings basad of the postmedial lines and the postmedial line on the hindwing originates from a dark mark on the costa.

It is certainly not referable to *rhagavolita*. Hampson noted that some specimens have dark blotches on the inner margins of both wings. Since the present specimen fits this description and there appears to be no name for this form (or possibly species), the name *nigropunctata* nov. is proposed. The type specimen can be the species examined in the present study, since it has been adequately described above. However, its true affinity and status will only emerge when more material is available.

Dysaethria ruptaria (Moore) comb. nov.1888. *Descr. new. Ind. Lep. Ins. Colln. W.S. Atkinson*:

259.

Material Examined: 5 exs.: 20.ix.1995; 6.ix.1997 female; 4.viii.1999; 9.viii.2000; 26.vii.2003.

Forewing Length: 7-8 mm.

Expanse: Male 16 mm; female 18 mm (Hampson 1895); 16-18 mm (mihi).

Distribution: Dharamsala (Himachal Pradesh); Calcutta (W. Bengal).

Remarks: The smallest member of the genus in the area. This is the first record from the outer ranges of the Himalaya, although its appearance in Calcutta (=Kolkata) suggests that it occurs at all elevations up to 1800 m and throughout the breadth of the Himalaya, at least as far west as Dharamsala, which is in the main range.

It is not a common moth in the Bhimtal valley. There appear to be two annual broods, one in early August and the second in September. There may be more broods at lower elevation.

It rests with the wings outspread, the head and the costae of the forewings touching the substrate, while the remaining part of the forewings slope upwards at an angle of roughly 30 degrees to the substrate. The inner margins of the forewings are thereby raised quite high above the substrate, and are nearly in a straight line when viewed dorsally. The apices of the hindwings also touch the substrate but the remaining portion of the hindwings slope proximally towards the dorsum of the abdomen. Although they do not cover the abdomen, they form a sort of tent with the uncovered abdomen as centre pole.

All the specimens examined match Hampson's (1895) description.

Sylvipterna gen. nov.

Type species: *bicaudata* (Moore)

Diagnosis: Similar to *Dysaethria* Turner, but differs in the presence of two anal veins in the hindwing. Vein M_2 is present in the hindwing. The venation and head of the male is illustrated in Hampson (1895: fig. 71). The venation of the female's hindwing is similar to both sexes of *Somwaria* gen. nov. described below.

Sylvipterna bicaudata (Moore) comb. nov. (Fig. 5)1867. *Proc. zool. Soc. Lond.*: 643, pl. 33, fig. 12.

Material examined: 3 exs.: 17.viii.1992 Auli, Chamoli district 2100 m, male; 25.viii.1997 female; 24.vi.2000 female.

Forewing length: 11-12 mm.

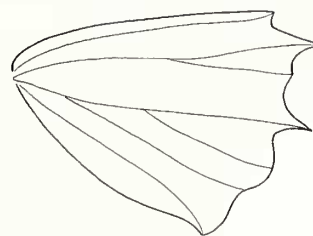


Fig. 5: Hindwing recto venation of *Sylvipterna bicaudata* (Moore) female

Expanse: 26 mm (Hampson 1895); 24-26 mm (mihi).

Distribution: Dharamsala (Himachal Pradesh); Sikkim; Khasis (Meghalaya).

Remarks: The present records are the first from the outer ranges of the Himalaya west of Nepal. It is a rare species in the Bhimtal valley, but may be commoner in the main range. I have recorded it from Auli in the main range and Dharamsala is also in the main range.

The moth rests in a manner similar to *Somwaria restricta* Hampson comb. nov., which is described below. *S. bicaudata* and *restricta* should perhaps be placed in the same genus, given the similar fascies, resting posture and venation of the female. The male's venation, however, is difficult to reconcile and until some more stable character is discerned, perhaps in the genitalia, it is best to treat them in separate genera.

The specimens match Hampson's (1895) description. There appear to be two annual generations, one in late June and early July and the second in late August.

Somwaria gen. nov.

Type species: *restricta* (Hampson)

Diagnosis: Similar to *Dysaethria* Turner but differs in the absence of vein M_2 on the hindwing. There are no discocellulars on the hindwing and only one anal vein. Venation of both sexes similar, unlike *Sylvipterna*.

Somwaria restricta (Hampson) comb. nov.1895. *Faun. Brit. Ind., Moths* 3:130.

Material Examined: 13 exs.: 13.viii.1995; 15.viii.1995; 11.vii.1990; 9.viii.1997 x2; 19.viii.1997 x2; 20.viii.1998; 12.vi.1999; 2.vii.1999; 3.viii.1999; 30.vii.2000; 2.viii.2000.

Forewing Length: 10-11 mm.

Expanse: 26 mm (Hampson 1895); 22-24 (mihi).

Distribution: Sikkim; Nagas (Nagaland).

Remarks: A new record for the Himalaya west of Nepal. It is a common moth in the Bhimtal valley, much more frequently met than *Sylvipterna bicaudata*. However, it is doubtful whether it is found in the main range.

In addition to the material examined, individuals of this species were also noted on 8.ix.1999 and 30.ix.1999. There appear to be several overlapping generations in the Bhimtal valley during the monsoon months.

The moth rests with its wings outspread, the inner margin of the forewings held in a straight line, the head and distal half of the forewings pressed to the substrate. The outstretched hindwings are drawn together towards the abdomen, leaving a gap between the fore- and hindwings. The hindwings do not cover the abdomen and, unlike *Dysaethria ruptaria*, do not touch the substrate. Although the hindwings rise tent-like towards the dorsum of the abdomen, both fore- and hindwings are in more or less the same plane, unlike *D. ruptaria*. The body of the moth is held at an angle to the substrate, so that it rises gradually towards the tip of the abdomen, which is the part of the moth furthest from the substrate.

This moth is an agile runner and can run forward or sideways with equal facility. It is a very nervous creature and gets agitated if other insects move about near it, unlike *D. reticulata* and *D. multistrigaria*.

During the daytime, they settle in the position described above on the upper surface of low growing shrubs, especially on overcast or rainy days.

Pangteyia gen. nov.

Type species: *ocusta* (Swinhoe)

Diagnosis: Male with antennae thickened and flattened. Forewing with the outer margin produced to points at Cu1b and M₁; veins R₁ and R₂ stalked, R₁ anatomosing with Sc; hindwing with the costa excised at middle and with a tuft of hair before middle; vein M₂ present; the first anal vein weakly developed along the basal half of dorsum, the second normally developed; the outer margin produced to an oblique tail at vein M₃ and to points at veins Cu1b and Rs.

The genus is named for Y.P.S. Pangtey, former Professor of Botany at Kumaon University, Nainital, in recognition of his many kindnesses over the years.

Pangteyia ocusta (Swinhoe) comb. nov. (Fig. 6)

1894. *Trans. Ent. Soc. Lond.*: 165.

Material Examined: 5 exs.: 9.ix.1998; 10.vii.1999; 12.ix.1999; 26.vii.2000; 21.v.2003.

Forewing Length: 12 mm.

Expanse: 24 mm (Hampson 1895); 26 mm (mihi).

Distribution: Sikkim; Khasis (Meghalaya).

Remarks: A new record for the Himalaya west of Nepal. It is quite a rare moth in the Bhimtal valley. The above records suggest that the moth has at least two and perhaps three

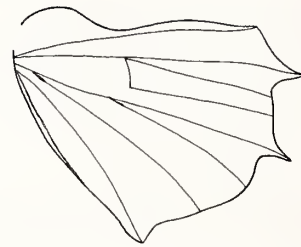


Fig. 6: Hindwing *recto* venation of *Pangteyia ocusta* (Swinhoe) male

annual broods. This in turn suggests that it is better established at some locality within dispersal range of the main study site and the moth is not actually resident in the Bhimtal valley.

The moths examined match Hampson's (1895) description except in the matter of size and that on the forewing *recto* the antemedial line does not expand into a red brown patch. At night, it settles with its wings outspread, rather like *Dysaethria himalayica*. During the daytime, the wings are pressed flat to the substrate and crumpled lengthwise, so that they appear to be corrugated. There is a gap between the tornus of the forewing and the apex of the hindwing.

Himablema gen. nov.

Type species: *pectinicornis* (Dudgeon)

Diagnosis: Antennae of male bipectinate; outer margin of forewing evenly curved; male with a fovea below base of cell; hindwing produced to points at veins M₃ and Rs; a lobe at base of costa articulating with the retinaculum as well as the frenulum; vein M₂ weakly developed and the costal lobe with a curved veinlet.

Himablema pectinicornis (Dudgeon) comb. nov. (Fig. 7)

1896. *Faun. Brit. Ind.*, Moths 4: 549.

Material Examined: 12 exs.: 8.viii.1997; 20.viii.1997; 23.viii.1997; 26.viii.1997. 1.ix.1997; 23.v.1998; 14.vii.1999; 3.viii.1999; 9.vi.2002; 27.vii.2003; 5.viii.2003; 23.viii.2003.

Forewing Length: 11-12 mm.

Expanse: 26 mm (Hampson 1896); 24-26 mm (mihi).

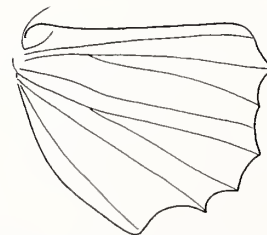


Fig. 7: Hindwing *recto* venation of *Himablema pectinicornis* (Dudgeon) male

Distribution: Sikkim; Bhutan.

Remarks: A new record for Kumaon. It is well established in the Bhimtal valley. In addition to the material examined above, a specimen was also noted on 23.vii.1999; two on 26.vii.1999; five on 6.viii.1999; three on 12.viii.1999; one each on 22.viii.1999 and 24.viii.1999; two on 25.viii.1999 and one on 26.viii.1999.

It is relatively common in some years, with the peak flying time in August. The record from May is unusual, since it is hot and dry at the time, whereas most members of this subfamily are on the wing only during periods of high atmospheric humidity.

The moth rests with its wings outspread and held against the substrate. There is a gap between the fore- and hindwings not as wide as in *Dysaethria ruptaria*, *Sylvipterna bicaudata* and *Somwaria restricta*. It is possible that this moth adopts a different position when resting during the daytime, but this has not been observed so far.

The specimens examined match Hampson's (1896) description. In addition, on the forewing *recto*, there is an indistinct antemedial line and a dark spot on the discocellulars. In some individuals, the submarginal lunulate dark mark below the forewing apex is broken up into two spots, the upper one smaller than the lower one.

Phazaca theclata (Guenée)

1857. *Hist. Nat. Ins. Lep.: Uran. et Phal.* 2: 36.

Material Examined: 1 ex.: 28.x.2003 (male).

Forewing Length: 10 mm.

Expanse: 22 mm (Hampson 1895; mihi).

Distribution: W. Africa; throughout India, Sri Lanka, Myanmar (Hampson 1895); Afrotropical Region, mainland Asia (Holloway 1998).

Remarks: A new record for Kumaon. Almost certainly will be more frequently met at lower elevation. The single specimen recorded is the only one seen so far in the Bhimtal valley.

In the specimen examined, the pale ochreous brown ground colour of the hindwing's distal half extends past the medial line to parts of the proximal half of the wing.

Phazaca sp. of the *unicauda* (Hampson) group

1891. *Illust. Typ. Lep. Het. in the Colln. Brit. Mus.* 8: 103, pl. 150, fig. 21.

Material Examined: 2 exs.: 29.vii.2001 female; 20.vii.2003 female.

Forewing Length: 8 mm.

Expanse: 22 mm (Hampson 1895); 18 mm (mihi).

Distribution: Sikkim; Nilgiris (Tamil Nadu) (Hampson 1895); Indian Subregion (Holloway 1998).

Remarks: The two specimens have not been assigned a species, since the fascies match quite well the illustration of the putative female of *Phazaca unicaudoides* Holloway (1998), (pl. 7, fig. 46), but since the latter is restricted to Borneo, it is better to err on the side of caution until more material is available. The next closest is *unicauda*, but the specimens examined differ in having two short tails on the hindwing, exactly as in Holloway's specimen mentioned above. The remaining differences between Hampson's description and the specimens examined i.e. the reduction of the marginal fuscous lunules on the forewing to a series of specks; the presence of a curved postdiscal line and a short medial spur on the costa, the hindwing with the postdiscal line angled rather than curved and the absence of a marginal lunulate line are perhaps too many to ascribe to sexual dimorphism, since Hampson's description is of a male and the specimens examined are females. Holloway (1998) is also quite clear that the female of *unicauda* lacks the hindwing tails. In addition, the vertex of the head and antennae are brown, not white in the specimens examined.

An examination of males of this species, when they eventually appear, will help resolve the status of this species unequivocally.

Phazaca leucocera (Hampson)

1891. *Illus. Typ. Lep. Het. Coll. Brit. Mus.* 8: 102, pl. 150, fig. 13.

Material Examined: 15 exs.: 18.vii.1995 x2; 25.x.1998; 11.viii.1998 Durgapur, Nainital 1600 m; 20.vii.2003 x3; 21.viii.2003 x5; 26.ix.2003 Durgapur, Nainital 1600m; 1.ix.2003; 25.xi.2003.

Forewing Length: 9-10 mm.

Expanse: 22 mm (Hampson 1895); 20-22 mm (mihi).

Distribution: Nilgiris (Tamil Nadu); Sri Lanka (Hampson 1895); South India; Hong Kong, Borneo, Solomon Is. (Holloway 1998).

Remarks: A new record for Kumaon. The species is quite common and I have also recorded it from Durgapur. It swarmed in both locations for two weeks from August 10 to 24, 2005, with over 50 individuals settled around each lamp left on in the area.

Both the specimens mentioned by Holloway (1998) are from low elevation, so it is more than likely that this species will be better established at low elevation in Kumaon too.

Specimens appear to emerge sporadically and it is difficult to judge the number of generations of this moth in a year. The record from late October is almost certainly a straggler, but whether it emerged late from its pupa or is a part of a large, regular brood at lower elevation that straggled up is uncertain.

At rest, the forewings are scrolled so that the moth somewhat resembles *Monobolodes* Warren, but the members of the latter genus tend to fold their wings tightly, so that they resemble a twig, while *leucocera* folds them loosely, so that the outer margin is wider than the basal area.

The specimens examined match the description in Hampson (1895).

***Warreniplema fumicosta* (Warren)**

1896. *Ann. Mag. Nat. Hist.* (6) 17: 215.

Material Examined: 3 exs.: 13.v.1998; 22.iv.2001; 21.ix.2003.

Forewing Length: 10 mm.

Expanse: 22 mm (Hampson 1896; mihi).

Distribution: Khasis (Meghalaya); Nagas (Nagaland) (Hampson 1896); N.E. Himalayas, Taiwan, Borneo (Holloway 1998).

Remarks: A new record for Kumaon. It is not common in the Bhimtal valley. There are two annual broods. It has probably been overlooked among the commoner *Monobolodes simulans* (Butler), which looks very similar when settled.

According to Holloway (1998), both Bornean specimens were recorded at 1618 m elevation. Since the Indian records, too, appear to be from hilly areas, the species seems to be a montane one.

The appearance of this moth in Kumaon is unexpected, since it has not been recorded from the Himalaya proper so far. Although the same can be said of *Phazaca leucocera*, it has a wider distribution and its appearance therefore cause less surprise.

The specimens match Hampson's (1896) description perfectly.

***Monobolodes simulans* (Butler)**

1889. *Illust. Typ. Spec. Lep. Het. Colln. Brit. Mus.* 7: 81, pl. 133, figs 6, 7.

Material Examined: 20 exs.: 9.viii.1997; 10.viii.1997 x2; 23.viii.1997; 30.iii.1991; 23.iv.1998; 29.iv.1998; 2.v.1998; 25.v.1998; 7.ix.1998; 23.iv.1998 female; 16.ii.1999; 16.iii.1999 female; 25.ix.1999; 1.x.1999; 2.xii.1999; 28.iii.2000; 21.vii.2003; 20.vii.2003. 30.xi.2003.

Forewing Length: 10-14 mm.

Expanse: 24 mm male, 28 mm female (Hampson 1895); 22-30 mm (mihi).

Distribution: Kangra (Himachal Pradesh) (Hampson 1895); Himalayan (Holloway 1998)

Remarks: A common species in the Bhimtal valley, where it is the only Epipleminae that is on the wing practically throughout the year. In addition to the above records, it has

also been noted on 9.xi.2003 and 10.xi.2003. However, it does not seem to be so common in Durgapur, so perhaps it is only locally common.

Some specimens differ from Hampson's (1895) description in lacking the rufous apical patch on the forewing. According to Holloway (1998), in this group of species, the female's hindwing is duller brown than the male's, or even black, with generally less rufous forewings. This difference is evident in the specimens examined, although Hampson does not mention it.

The moth rests with its forewings folded so that they are of almost uniform thickness throughout and bear a remarkable resemblance to a twig. The fold, when viewed from the side, is in the form of a highly stylized figure S, with the costa rolled over until it touches the medial veins and forms a sort of tube while the lower half of the wing is tucked under the tube and resembles the lower half of the figure S. (Fig. 8b). Only the tornus of the forewing touches the substrate. The hindwings are held close to the abdomen. The costa is almost parallel to the abdomen. Near the outer margin, the tips of the medial veins touch the substrate and the lower half of the wing slopes sharply upwards to cover the abdomen. There is an anal fold. The antennae are held under the wings, sometimes trailing out between the wings as illustrated in Fig. 8a. This position is adopted immediately upon settling and it is only very occasionally that the moth is seen for any length of time with the wings expanded to their normal span.

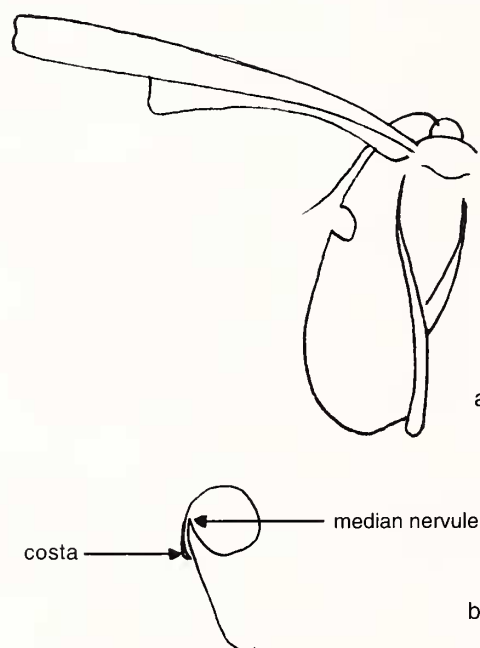


Fig. 8: a. Dorsal view of a resting *Monobolodes simulans* (Butler), b. Lateral view of the folded forewing of *M. simulans* (Butler) showing how the wing is furled

DISCUSSION

Hampson (1895, 1896) recorded seven members of Epipleminae from the Himalaya west of Nepal. Of these, five have been recorded in the present study and two, "*Epiplema*" *columbaris* Butler and *Nossa nelcinna* (Moore), have not been recorded. "*E.*" *columbaris* appears to be a western Himalayan endemic, the only known records being from Dharamsala and Shimla in Himachal Pradesh (Hampson 1895). It is possible that this moth will be found at higher elevation or in the main range in Kumaon and Garhwal since Shimla is higher than the Bhimtal valley and Dharamsala is in the main range.

The eight new records and one unidentified species in this paper take the total to sixteen species of Epipleminae known from the Himalaya west of Nepal. In addition I have a specimen of *Oroplema* Holloway from Bhimtal, which makes a total of seventeen species. Work on this subfamily has been carried out at only four locations in Kumaon and Garhwal i.e. the main study site in the Bhimtal valley, Durgapur in Nainital, Maheshkhan and Auli forests, so it is more than likely that further new records or even species will appear when other biotypes are properly surveyed.

Of the fourteen species recorded in this study, the status of *Dysaethria rhagavata* form *nigropunctata* is uncertain while the identity of one species, treated under *Phazaca*? *unicauda*, is also uncertain. Of the remaining dozen, eight are endemic to the Himalaya and hills of N.E. India while *D. ruptaria* appears to be restricted to N. India. The two species from the W. Himalayas not recorded in the present study are also Himalayan endemics.

Two species, i.e. *Phazaca theclata* and *P. leucocera*, are widely distributed, the former perhaps the most widely distributed Old World Epiplemine. The distribution of *Warreniplema fumicosta* is particularly interesting, since it is a montane element that has colonized the Himalaya, Taiwan and Borneo. I can think of only one other genus with a similar distribution, *Mahanta* Moore (Limacodidae). However, there are two species of *Mahanta* over this range, with the Bornean species recently discovered and described.

The large percentage of Himalayan endemics is unmatched by any other subfamily or family. However, it should be noted that the geographical distribution of the Epipleminae is far from satisfactorily known and several species may eventually turn out to be more widespread than is currently believed.

Flying time

Broadly speaking, all the species included in the present study are active when relative humidity levels are over 15%. The exception is *Monobolodes simulans*. Peak flying times

for most species coincide with the highest annual humidity levels in late June, again in late July and the first week of August and lastly in mid-September. Some species like *D. reticulata* are on the wing continuously through the S.W. Monsoon while others, such as *D. ruptaria* and *P. ocusta*, appear sporadically. It is noteworthy that none of the species except *M. simulans* and *W. fumicosta* are on the wing during the dry winter or dry summer months, i.e. from December to mid-May.

Resting attitude

Watson and Whalley (1983) noted that at rest, the wings of members of this (sub) family are folded in various ways. The hindwing is usually folded along the side of the abdomen while the forewings can be either flat or rolled. Similarly, Barlow (1982) stated that when at rest the forewing is usually held flat against the surface while the hindwing is curiously raised and held partly furled along the abdomen, separate from the forewing.

Holloway (1998) noted that the resting position is sometimes modified, particularly in *Phazaca* Walker, *Monobolodes* Warren, *Warreniplema* Holloway and *Europelema* Holloway. The wings are otherwise (i.e. in *Dysaethria* Turner, *Oroplema* Holloway, *Pterotosoma* Warren, *Leucoplema* Janse, etc.) held flat against, or parallel to, the substrate at rest.

In this study, I have described the resting attitude of most of the species, since not all species adopt the positions described above when settled. It seems that the resting attitude has some taxonomic value. The members of *Phazaca* adopt a similar position, so similar that it is difficult to distinguish *P. ?unicauda* from *P. leucocera*. *W. fumicosta* and *M. simulans* adopt a very similar position too, so similar that it requires close examination to distinguish them, since the characteristic pale areas of *fumicosta* are obscured by the way the wings are held.

The resting attitude of *P. ocusta* is unique among the species studied in this paper. *S. bicaudata* and *S. restricta* have an identical resting position, while *D. reticulata* and *D. multistrigaria* also have quite similar resting positions. *D. himalayica* and *D. rhagavata nigropunctata* have a similar resting position, which Holloway (1998) described as normal for the genus. *D. ruptaria* differs from all the others, but is closest to the other species with a white groundcolour, *S. bicaudata* and *S. restricta*. However, *Dysaethria* is a rather large genus with several sub-groups, so it is only to be expected that the physical structure of the members will vary to some extent, as will, consequently, their resting attitudes.

Some species, i.e. *D. himalayica* and *S. restricta* have been found settled on the upper surface of leaves of low

growing shrubs during the daytime. Presumably, other members of the subfamily, too, pass the daylight hours on such perches. While *himalayica*, *H. pectinicornis*, *P. ocusta*, *D. multistrigaria* and *D. reticulata* are soberly coloured and easily escape attention, *Somwaria restricta*, *Sylvipterna bicaudata* and *D. ruptaria* have a white groundcolour which attracts attention. These moths are not known to be chemically protected. All the latter three species have a superficially similar resting attitude. The most obvious offensive, white thing on the upper surface of a leaf in a forest is a bird's dropping and some moths are known to depend on their resemblance to this to avoid unwelcome attention from foraging birds. It would be interesting to discover what factors the white Epipleminae exploit in order to survive the daylight hours.

Flight

The flight is weak and is sustained solely by rapid wingbeats. These moths appear to be incapable of gliding

flight. Like the Geometridae, they do not require a "warming up" period before taking wing even at low temperatures; they can take wing as soon as they are disturbed. However, the flight is generally not of long duration.

ACKNOWLEDGEMENTS

A part of this work was carried out under a Times Fellowship 1991 for which I am grateful to the Times of India Group. The kind and unexpected gift of literature from Henry S. Barlow of Kuala Lumpur, Malaysia and the help provided by Prof. Y.P.S. Pangtey of the Botany Department of Kumaon University, Nainital is gratefully acknowledged. Prakash C. Paliwal, Rekha Sharma, Anita Martolia and Kanchan Upreti of the same department were very helpful and resourceful and they are gratefully acknowledged. I am grateful to the Editor for improving the quality of this paper.

REFERENCES

- BARLOW, H.S. (1982): An Introduction to the Moths of S.E. Asia. Malayan Nature Society, Kuala Lumpur, 305 pp., 51 pl.
- HAMPSON, G.F. (1895): The Fauna of British India including Ceylon and Burma, Moths Vol. 3. Taylor & Francis, London, xxviii + 548 pp., 226 figs.
- HAMPSON, G.F. (1896): The Fauna of British India including Ceylon and Burma, Moths Vol. 4, Taylor & Francis, London, 28 + 594 pp., 287 figs.
- HOLLOWAY, J.D. (1986): The Moths of Borneo, Part 1: Key to Families: Cossidae, Metarbelidae, Ratardidae, Dudgeonidae, Epipyropidae, Limacodidae. *Malay nat. Journ.* 40: 1-165, 9 pl., figs.
- HOLLOWAY, J.D. (1998): The Moths of Borneo, Part 8: Castniidae, Callidulidae, Drepanidae and Uraniidae. *Malay nat. Journ.* 52: 1-155, 10 pl.
- SMETACEK, P & R. SMETACEK (2000): A supplementary list of the host-plants of Indian Lepidoptera. *J. Bombay Nat. Hist. Soc.* 97: 157-160.
- WATSON, A. & P.E.S. WHALLEY (1983): The Dictionary of Moths and Butterflies in colour. Peering Books, London. 296 pp.

